THE CONTENTS OF THIS DOCUMENT ARE THE HIGHEST QUALITY AVAILABLE.

INITIAL PAL DATE 3/17/9

Project Fi	le Number	3X2TTH000	
EDF Serial	Number _	BWP-ISV-006 Rev.	0
Functional	File Num	ber	

#### ENGINEERING DESIGN FILE

Project/	Task	BWP :	In Si	tu	Vitri	fication	
						<b>Estimate</b>	

EDF Page <u>1</u> of <u>2</u>

Subject: Production Scale Cost Estimate

Abstract: Following is the FY-1989 cost estimate for production scale ISV for treating the TRU contaminated pits and trenches of the Subsurface Disposal Area (SDA) as described in EDF BWP-ISV-007 Rev. 0 (attachment 1). This estimate includes the two options of using either nine or six sets of process equipment along with the estimate for providing power to these units at the RWMC. These two options, six and nine units, were selected to establish the costs required to complete the project in five and eight years of operation respectively. These times assume that the ISV units have been fabricated, checked-out, crews trained, and power upgrades complete prior to the proposed FY-1996 start-up. These costs do not account for the cost associated with research and development to establish the feasibility and to develope the technology for application to the SDA.

Option	Total Estimated Cost for Units (\$)	Total Operational Cost (\$)	Power Upgrade Cost (\$)	Total Cost (\$)
Six units	40,000,000	310,000,000	14,000,000	364,000,000
Nine units	57,000,000	290,000,000	14,000,000	361,000,000

For each of the options the following allowances are made. No additional paved roads or parking lots are needed. For power from the RWMC to the melt sites, allowances are made for 40 foot poles, hardware, and 13.8 KV conductor. For the six unit option, an allowance of 8,400 linear feet of conductor is made. For the nine unit option 12,000 linear feet of conductor is made. These power lines are from dead end pole structures to the saturable reactor transformer. Allowances are also made for lower voltage lines to power the other trailer equipment, but no allowance is made for the transformers. Costs are estimated using shift work so no allowance are made for overtime or weekend work, No allowances are made for an environmental impact statement (EIS), or for a tank truck to carry scrubber solution. Though allowances are made for the cost of disposing the waste.

For power to the RWMC, the estimates include three 20 MVA transformers and 20 miles of of 138 KV poles, hardware and cable. No allowances are made for rock excavation.

Distribution (complete package)

J. L. Landon, B. Charboneau, P. J. Hill, M. R. Schletter, T. L. Rasmussen, S. P. Fogdall, Project EDF file, ARDC EDF File

Distribution (cover sheet only): EDF serial no. log

Author J. M. Beller Dept. Revie

Reviewed Date Date

Approved Date Date

The estimates are based on the design work being performed by EG&G Idaho, Inc., the equipment being Government Furnished Equipment (GFE), purchased by EG&G, the power line construction being subcontracted. These estimates include directs, indirects, design, inspection, construction management, procurement fees, and project administration costs. Escalation is included to 1996. The total contingency are 26% for the six unit operation, 23% for the nine unit operation, and 35% for the power upgrade. These contingencies are considered reasonable for a project in the planning stage. Refer to the estimate sheets (attachmant 2 and 3) for more detail.

**EG&G** Idaho, Inc. FORM EG&G-2631 (Rev.11-87)

Project File	Number	3X2TTC200		
EDF Serial	Number	BWP-1SV-007	Rev	0
Frankisa 1				

#### ENGINEERING DESIGN FILE

Project/Task	ISV Treatability Study
Subtask <u>Large</u>	e-Scale Demonstration Test

EDF Page 1 of 2

Subject: Time Required to Vitrify TRU-Contaminated Pits and Trenches at the SDA

#### Abstract:

An estimate is obtained for the time required to vitrify the contents of the pits and trenches at the SDA containing TRU waste (trenches 1-10, pits 1-6, 9,10). The following assumptions are made:

· Electrode separation = 10 feet for trenches, 16 feet for pits

· Width of melt = 18 feet for trenches, 30 feet for pits

 Average excavated depth, overburden depth, and dimensions are as given by reference (1).

· Underburden depth = 3 feet

Run time per melt as a function of total melt depth is given by reference (2).

overlap between melts = 2 feet

 Calculated process unit times includes 24 hours between melts for moving equipment and 10% for maintenance.

#### <u>Results</u>

The following table shows the calculated values of the process unit days required for vitrification of trenches 1-10 and pits 1-6,9,10 along with the values of parameters employed in the calculations and other associated calculated quantities (calculations attached). The melt depth denotes the average value of the maximum melt depth (includes overburden, contaminated soil and underburden). The surface area is the estimated actual surface area of the pits and trenches (1). The time/melt is the time required for one melt (does not include the time required to move the equipment or maintenance time). The # of melts is the number of melts required for vitrification, allowing for sufficient overlap between melts and sufficient extra melt around the boundaries (rounded up to nearest multiple of 10). The area vitrified is the actual area vitrified (effective area per melt multiplied by the number of melts). The volume vitrified is the actual volume vitrified (area vitrified multiplied by the melt depth). The process unit days required is the number of days required for vitrification (includes 24 hrs between melts for moving equipment and maintenance time of 10%).

Distribution (complete package) J.L. Landon, B.L. Charboneau

Distribution (cover sheet only): Project EDF file log, EDF serial no. log

Author Im Militle Dept. Reviewed Date Approved Date

J.B. Melville EDOO Centh O Know 2-21-89 15 Marken 3/2/29

TABLE 1 ISV PROCESS CALCULATIONS FOR TRU-CONTAMINATED PITS AND TRENCHES AT THE SDA

Trench, pit #	Melt Depth, ft.	Surface Area, sq. ft.	Time/ melt hrs	# of melts	Area vitrified, sq. ft.	melt vol. cu ft./	Process unit days required
tr.'s 1,5,7,9	18	29,050	62	300	74,700	1.34	1,183
tr.'s 2,3,4, 6,8,10	24	47,313	90	490	121,662	2.92	2,560
pit 1	23	30,824	210	60	40,560	0.932.	644
pit 2	25	99,064	300	180	121,680	3.04	2,673
pit 3	18	47,230	150	100	67,600	1.22	798
pit 4	22	104,979	210	200	135,200	2.97	2,145
pit 5	22	66,952	210	110	74,360	1.64	1181
pit 6	22	54,575	210	90	60,840	1.34	966
pit 9	20	42,802	210	80	54,080	1.08	858
pit 10	24	112,015	300	190	128,440	3.08	2,822
total		634,804		1,800	879,122	19.56	15,830 (44 yrs)

A similar calculation (attached) shows that the time required to vitrify the entire SDA (including the areas between pits and trenches) would be approximately 169 process unit years (includes 24 hours between melts and maintenance time of 10%).

### **REFERENCES**

- "History of Buried Transuranic Waste At The INEL", March 1977, D.H. Card, EG&G Idaho, Inc.
- "In Situ Vitrification of Transuranic Waste: An Updated Systems Evaluation and Applications Assessment", March 1987, J.L. Buelt, C.L. Timmerman, K.H. Oma, V.F. FitzPatrick, and J.G. Carter, Pacific Northwest Laboratory, PNL-4800 Suppl. 1, page 116

# Calculation of Time figures to Vitity TRU Ware at in INEL

electrode sprin in = melt wirth = 30ft. run time given as a sunstin of meth depth by Figure 575 says time between meits = 24 hours pits considered: tremshed considered: 1-10 pite considered: 1-6, 9,10 overturers unverturen vitosfied

3 ft. underbunden, 2 stroverlag between settings maintanance time not included here Trench 1,5,7,7

Total 4... = 4150 width = 75%. overanden depth = 5ft. eneavaled septh = 101t. uncertained depth = 3ft. -> meld cipth = 1814. = 6 m. I can time # 150 hrs. Assume 2 St. overlap beforeen settines. -> # of sellings = 4150 = 160 settings total rum time = (160)(150) + (160)(24) = 27,840 hrs. = 1160 days

### Trench 2, 3, 4, 6, 8, 10

Langtho = 1114, 1124, 1132, 1130, 1132, 1127 fx. width = 75t. total laught = 6,759 ft. overburden = 5th esc. depth = 16H. unverbures = 3ft. - meit dipth = 248h = 7.3 m. - run time = 210 hrs. 311 one ap between softings. Berne - = of schings = 6,759 = 260

total 1 m time = 1260 (210+24, = 60, 840 hrs. = 2535 days

Assume Instead 3 m. einterie co. meit wirth = 18 ft.

### Trenches 1, 5, 7, 9

turn time = 62 hrs. total 2...th = 1161 + 2,989 = 4,150 ft. # of sellings =  $\frac{4150}{18-4}$  = 300

total run Ame = 300 (62+24) = 25, 800 hrs. = 1,075 days

### Tremis: 2,3,4,6,8,10

tun time = 90 hrs. # of sellings  $\frac{6.759}{14}$  = 490 to hat vm time = 490(90+24) = 55,860 hrs. = 2,328

P:+ 1 = surface area = 30, 824 842

Approximate length = 235ft. + 120 = 455ft.
Approximate width = (30,824ft2)/455ft. = 68ft.
Assume elec. width = 5m. - meric width = 26ft.

Alsume 21. overlap. between ecllings.

TRU wonde ?

SLA whole?

off.

235 ft

- 3 settings to cover width and allow extra space on sides.

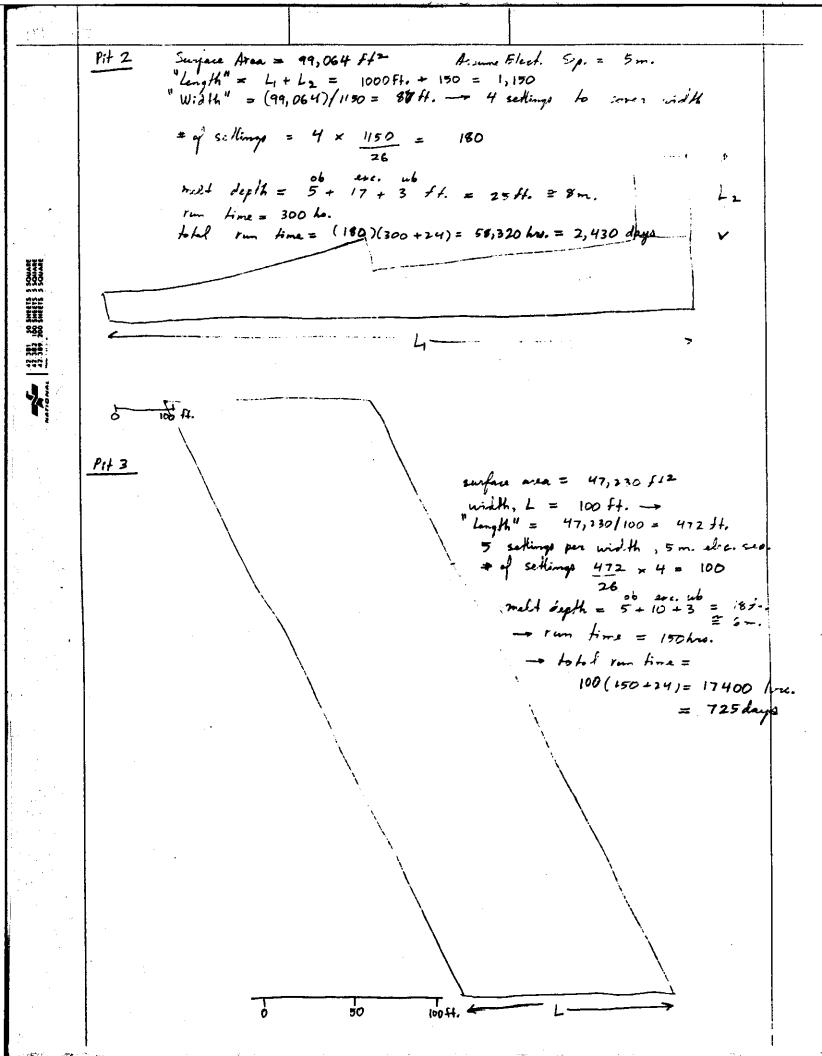
overhunden = 614.

erc. ought = 14th.

melt depth = 23 Ft. = 7m.

-> run time = 210 hrs.

total run time = 60(210+24) = 14,040 hrs. = 585 days



Surface area = 104, 979 fiz " Zenath" = 1000ft. P:+4 -- winth" = 104ft. -> = settings per winth 5 m. ede. - je. # of se Hings = 5 x 1000/26) = 200 nelt depth = 8+ 11 + 3 = 22 ++. = 7m. run time = 210 hrs. 200 (710+24) = 400 46800 hu. 1950 days. 100 F4. Pit 5 Approximate as triangle 4= 300 ft. surface area = 66,952 ft2 = 1 4, 62 -> L, = 450ft. "length" = Lz = 450St. "width" = 1 L, = 150ft.  $\frac{150}{23} = 6 \text{ setings per windth},$  5 m. else. sep.+ of settings = 6x 450 6x 450 = 104 - 110 110 <del>+</del> 50f∔ melt depth = 7+ 12+3 = 22 ft. rm Ame = 210 hrs. total run time = (110)(210+24) = 25,740 had = 1073

```
surface area = 54,575ft2
              Pit 6
                          Windth = 120 H. - 6 settings per windth, 5 m. elec. sip.
                       -> "length" = 54,575/120 = 455 ft.
42.381 50 SMEETS 5 SQUARE
42.382 100 SMEETS 5 SQUARE
47.389 200 SMEETS 5 SQUARE
                            * of sellings = 5 x 455 = 90
                            melt depth = 8 + 11 + 3
run time = 210 hrs.
                 50ft.
                              to tal run time = 90 (210+24) = 21,060 hrs. = 878 day;
          P:+ 9
        Surface area = 42,502 $12
        windth = 130 ft - 6 seftence with
        Sangth = 330ft.
        # of settings = 6 \times \frac{330}{26} = 80
        melt depth = 5+12+3=20ff
                      ₹ 7m.
         run time = 210 hrs.
         total run time = (210+24)(80)
                         = 18,720, hrs.
                           = 780 days
                                                                                          201t
```

0 1005

Surface area = 112,015 ft<sup>2</sup>

width = 120 ft.  $\rightarrow$  6 settings | and th, 5 m. eiese. s.p.

Length =  $\frac{112,015}{120}$  = 940 ft.

# of settings =  $\frac{940}{26}$  | 5 | = 190

melf depth =  $\frac{35}{8}$  +  $\frac{3}{13}$  +  $\frac{3}{13}$  =  $\frac{24}{13}$  +  $\frac{3}{13}$  =  $\frac{24}{13}$  +  $\frac{3}{13}$  =  $\frac{300}{13}$  +  $\frac{3}{13}$  +  $\frac{3}{13}$  =  $\frac{300}{13}$  +  $\frac{300}{13$ 

= 61,560 hrs.

= 2,565 days.

Whole SDA: melt depth (average et above pits): 22 ft. = 7m (+ average;

run time = 210 hrs.

Assume SDA is iso. Hrangle

Toke area = 88 zeres = (43,560)(88) = 3,834,000 ff<sup>2</sup>  $\frac{1}{2}(H+h)(1700) - \frac{1}{2}(310)(h) = 3,834,000 h | H = 310/1700 h = .182H$  $<math>150H + (850-155)h = 3,834,000 = 9.76.5H \rightarrow H = 3,927ff. h = 7.5/1.$  Approximate as rectangle

3,127'

3,727 x = 3,834,000 x = 976'

# of sellings per winth =  $\frac{976}{26}$  = 38 # 2 sellings 38 ×  $\frac{3927}{26}$  \rightarrow 5,740

total 1 m time = 5,740 (210+24) hrs. = 1,343,160 hrs. = 154 years.



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## INTEROFFICE CORRESPONDENCE

Date:

February 28, 1989

To:

B. L. Charboneau

From:

P. J. Hill PPAY 9273

Subject: IN-SITU VITRIFICATION -- PRODUCTION SCALE - REVISED - PJH-14-89

Cost Estimating has revised planning cost estimates for the subject project. The estimates are for providing production scale equipment for in-situ vitrification at the RWMC. There are two options of using either six or nine sets of equipment for the vitrification. The operating costs are revised to show the cost for each year of operation.

For each option, the following allowances are made. No additional paved roads or parking lots are needed since existing roads are available. These existing roads are currently used to deliver waste to the RWMC burial grounds. Since power supply to the RWMC would require a new power contract with a utility, no allowance is made in this estimate for providing power to the RWMC or for a substation at the RWMC. The power lines which are included do not include a transformer, but allow for 40-foot poles, hardware, and 13.8 KV conductor. For the option with six sets of equipment, an allowance of 8,400 lineal feet of conductor is made. For the option with nine sets of equipment, an allowance of 12,600 lineal feet of conductor is made. These power lines are from dead end pole structures to the saturable reactor transformers. Allowance is also made for lower voltage lines to power the other trailer equipment, but no allowance is made for transformers. No allowance is made for overtime or weekend work, for an Environmental Impact Statement (EIS), or for a tank truck to carry scrubber solution.

The estimates are based on the design work being performed by EG&G Idaho, Inc., the equipment being Government Furnished Equipment (GFE), the power line construction being subcontracted, and the equipment assembly being subcontracted.

These estimates include directs, indirects, design, inspection, construction management, procurement fees, and project administration costs. Escalation is included to 1996. Since current escalation sheets extend only to 1994, the 1994 escalation rates are used for 1995 and 1996. The total contingencies, which include construction management reserve and contingency, are 27 and 24 percent as shown on the summary sheets. These contingencies are reasonable for projects in the early conceptual design phase.

B. L. Charboneau February 28, 1989 PJH-14-89 Page 2

The total estimated cost of the six unit option is \$40,000,000. The total estimated cost of the nine unit option is \$57,000,000. Please refer to the attached revised summary sheets.

Revised operational costs are included in the attached table. The table is divided into a section on labor costs and a section on consumable costs. All costs are based on a total of 1800 settings operating in 15,830 unit days. These costs will vary depending on how many units are running in which year. Costs are listed according to year of operation. The crew costs are the same for each unit and do not allow for an economy of scale. The electricity cost includes power management costs in addition to the utility costs. Please refer to the attached tables.

For the six unit option, the labor costs are \$90,000,000 and the consumable costs are \$190,800,000. The total operating cost, including a ten percent contingency, is estimated to be \$310,000,000

For the nine unit option, the labor costs are \$82,100,000 and the consumable costs are \$176,800,000. The total operating cost, including a twelve percent contingency, is estimated to be \$290,000,000.

pjh

Attachments: As Stated

As Stated

Cc: R. W. Bonnenberg RWI-Central Files Project File #8167 P. J. Hill Letter File

### COST ESTIMATE SUMMARY

Type of Estimate : Conceptual	File No.:	8167	Date:	02/28/89
Project : In-Situ Vitrification Pr	oduction Sca	le 6 Unit	s	
Prepared By : P. J. Hill	Checked/Ap	proved By: _	15.5	
Unescalate	d	Escalatio	on	Totals:
Engineering, Design and Inspection Performance Specification Title I & II Design 1,100,00 Title III Inspection 800,00				
Construction Costs Subtotal Direct/Indirect Costs 4000 Improvement to Land 5000 Buildings/ Structures 6000 Utilities 7000 Equipment 8000 Demolition & Removal Indirect Costs 1,200,000	 0 n·	0	2,269,000	2,888,000
Construction Management Field Engr and Const Mgmt 259,000 Const Mgmt Reserve 152,000	כ	131,000 77,000	619,000	
Government Furnished Material Purchased By CM Purchased By 15,487,000 Procurement Fee 929,000	 ) )	0 6,492,000 389,000	*********	23,297,000
Project Administration Costs Project Management 1,700,000 Project Support 200,000	······· ) )	822,000 97,000	•••••	2,819,000
Subtotal	••••••	• • • • • • • • • • • •	•••••	31,660,000
Contingency 26% of Subtota	11	• • • • • • • • • • • •	•••••	8,340,000
Escalation (included in above totals)	•••••	9,512,000		
Total Estimated Cost				
COMMENTS: The total contingency for the management reserve and contingency a project in the early concerns.	ngency, is a	27 percent.	des both cor This is rea	istruction isonable for

#### **COST ESTIMATE SUMMARY**

Type of Estimate: Conceptual File No.: 8167 Date: 02/28/89 Project: In-Situ Vitrification -- Production Scale -- 9 Units Prepared By: P. J. Hill Checked/Approved By: Unescalated Escalation Totals: Engineering, Design and Inspection ( 80% of construction) 3,390,000 Performance Specification Title I & II Design 1,200,000 Title III Inspection 1,200,000 384,000 606,000 Construction Costs Subtotal ..... 4,235,000 4000 Improvement to Land 0
5000 Buildings/ Structures 0
6000 Utilities 4000 Improvement to Land 0 6000 Utilities 0 7000 Equipment 243.000 481,000 8000 Demolition & Removal Indirect Costs 1,750,000 854,000 Construction Management Field Engr and Const Mgmt 379,000 192,000 Const Mgmt Reserve 223,000 113,000 907,000 Government Furnished Material Purchased By CM Purchased By Procurement Fee 9,738,000 23,230,000 1,394,000 584,000 Project Administration Costs 3,857,000 Project Management 2,300,000 1,112,000 300,000 145,000 Project Support 300,000 145.000 Subtotal ...... 46,428,000 Contingency 23% of Subtotal..... 10,572,000 Escalation (included in above totals) ...... 13,971,000 Total Estimated Cost ...... 57,000,000

COMMENTS: The total contingency for this project, which includes both construction management reserve and contingency, is 24 percent. This is reasonable for a project in the early conceptual design stage.

### IN-SITU VITRIFICATION PRODUCTION SCALE COST ESTIMATE 6 Units

	1996	1997	1998	1999	2000	2001	2002	2003	Total	Basis
LABOR COSTS										
Management Management Administrative Support Vitrification Crew	329,000 62000	349,000 66,000	370,000 70,000	392,000 74,000	416,000 <b>78,</b> 000	441,000 83,000	467,000 88,000	495,000 93,000	3,259,000 614,000	4160 hours/year 2180 hours/year
Operator Maintenance Radiation Monitor Engineer	5,011,000 501,000 2,004,000 1,365,000	5,312,000 531,000 2,124,000 1,447,000	5,631,000 563,000 2,251,000 1,534,000	5,969,000 597,000 2,386,000 1,626,000	6,327,000 633,000 2,529,000 1,724,000	6,707,000 671,000 2,681,000 1,827,000	7,109,000 711,000 2,842,000 1,937,000	2,464,000 246,000 985,000 674,000	44,530,000 4,453,000 17,802,000 12,134,000	40 hours/day 4 hours/day 16 hours/day 8 hours/day
Heavy Equipment Crew Operator Laborer Electrician	271,000 485,000 57,000	287,000 514,000 60,000	304,000 545,000 64,000	322,000 578,000 68,000	341,000 613,000 72,000	361,000 650,000 76,000	383,000 689,000 81,000	129,000 231,000 27,000	2,398,000 4,305,000 505,000	19 hr/setting 34 hr/setting 4 hr/setting
Total Labor	9,694,000	10,275,000	10,892,000	11,546,000	12,239,000	12,973,000	13,752,000	4,756,000	90,000,000	
CONSUMABLE COSTS										
Electrodes Secondary Wastes Energy Consumption/Setting, kWh	17,810,000 221,400 318,000	18,879,000 235,000 318,000	20,012,000 249,000 318,000	21,213,000 264,000 318,000	22,486,000 280,000 318,000	23,835,000 297,000 318,000	25,265,000 315,000 318,000	8,491,000 105,000 318,000	157,991,000 1,966,000	
Energy Cost HEPA Filters	3,442,000 34,000	3,649,000 36,000	3,868,000 38,000	4,100,000 40,000	4,346,000 42,000	4,607,000 45,000	4,883,000 48,000	1,637,000	30,532,000 283,000	
Total Consumables	21,507,400	22,799,000	24,167,000	25,617,000	27,154,000	28,784,000	30,511,000	10,233,000	190,772,000	

Notes: All annual vitrification crew costs are based on 360 days/unit and 6 units/year for the first seven years and 118 days/unit for the eigth year. The heavy equipment crew costs are based on 246 settings per year for the first seven years and based on 78 settings during the eigth year. HEPA Filter costs are based on a 1996 cost of \$5,680 per unit per year. This assumes that filters will be replaced at the end of the year. The labor rate for operators, maintenance workers, radiation monitors, laborers, or electricians is \$58/hour in 1996 dollars; engineers and managers are \$79/hour. The secondary wastes are 2000 L/setting at \$0.45/L in 1996 dollars. The energy cost is \$0.044/kWh in 1996 dollars. The electrodes are \$72,400/setting in 1996 dollars.

### IN-SITU VITRIFICATION PRODUCTION SCALE COST ESTIMATE 9 Units

	1996	1997	1998	1999	2000	Total	Basis
LABOR COSTS							
Management							
Management	329,000	349,000	370,000	392,000	416,000	1,856,000	
Administrative Support	62000	66,000	70,000	74,000	78,000	350,000	
Vitrification Crew		,	,	,	.0,000	330,000	
Operator	7,517,000	7,968,000	8,446,000	8,953,000	8,383,000	41,267,000	40 hours/day
Maintenance	752,000	797,000	845,000	896,000	838,000	4,128,000	4 hours/day
Radiation Monitor	3,007,000	3,187,000	3,378,000	3,581,000	3,353,000	16,506,000	16 hours/day
Engineer	2,048,000	2,171,000	2,301,000	2,439,000	2,297,000	11,256,000	8 hours/day
Heavy Equipment Crew	•	• •	• • • • • • • • • • • • • • • • • • • •	_,,	_,,	,,	0 11041 07 407
Operator	406,000	430,000	456,000	483,000	455,000	2,230,000	19 hr/setting
Laborer	726,000	770,000	816,000	865,000	814,000	3,991,000	34 hr/setting
Electrician	85,000	90,000	95,000	101,000	96,000	467,000	4 hr/setting
	2222222222	******	======	======	######################################	*******	,
Total Labor	14,541,000	15,413,000	16,337,000	17,318,000	16,236,000	82,051,000	
CONSUMABLE COSTS							
Electrodes	26,643,000	28,242,000	29,937,000	31,733,000	29,921,000	146,476,000	
Secondary Wastes	331,000	351,000	372,000	394,000	372,000	1,820,000	
Energy Consumption/Setting, kWh	318,000	318,000	318,000	318,000	318,000	.,525,600	
Energy Cost	5,149,000	5,458,000	5,785,000	6,132,000	5,783,000	28,307,000	
HEPA Filters	51,000	54,000	57,000	60,000	0	222,000	
	2========	=======================================	========	=======================================	********	=======================================	
Total Consumables	32,174,000	34,105,000	36,151,000	38,319,000	36,076,000	176,825,000	

Notes: All annual vitrification crew costs are based on 360 days/unit and 9 units/year for the first four years and 319 days/unit for the fifth year.

The heavy equipment crew costs are based on 368 settings per year for the first four years and based on 328 settings during the fifth year.

WEPA filter costs are based on a 1996 cost of \$5,680 per unit per year. This assumes that filters will be replaced at the end of the year. The labor rate for operators, maintenance workers, radiation monitors, laborers, or electricians is \$58/hour in 1996 dollars; engineers and managers are \$79/hour. The secondary wastes are 2000 L/setting at \$0.45/L in 1996 dollars. The energy cost is \$0.044/kWh in 1996 dollars. The electrodes are \$72,400/setting in 1996 dollars.



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## INTEROFFICE CORRESPONDENCE

Date:

May 9, 1989

To:

J. M. Beller

From:

P. J. Hill PJH

Subject: ISV PRODUCTION POWER - PJH-32-89

Cost Estimating has prepared a planning cost estimate for the subject project. The estimate is for providing power to the In-Situ Vitrification (ISV) production-scale process.

As requested, the costs include three 20 MVA transformers and 20 miles of 138 KV poles, hardware, and cable. No allowance was made for rock excavation.

The total cost includes design, inspection, directs, indirects, construction management, Government Furnished Equipment (GFE), a procurement fee, project administration, and contingency. The total contingency, which includes construction management reserve and contingency, is set at 35 percent; this is a reasonable contingency for a project in the planning phase. All costs are escalated as shown in the attached escalation sheet. The total cost is estimated to be \$14,000,000.

Please refer to the attached summary and detailed estimate sheets.

pjh

Attachments:

As Stated

cc:

R. W. Bonnenberg Central Files Project File #5101 P. J. Hill Letter File

### COST ESTIMATE SUMMARY

Type of Estimate : Planning	]	File No.:	5101	Date:	05/09/89
Project : ISV Production Po	wer				
Prepared By : P. J. Hill		Checked/Ap	proved By:	KS	<u> </u>
	Unescalated		Escalatio	on	Totals:
Engineering, Design and Insp Performance Specification Title I & II Design Title III Inspection	ection ( 0 0	26%	of construct 0 312,000	tion)	1,696,000
Title III Inspection	235,000		114,000		
Construction Costs Subtotal Direct/Indirect Costs 4000 Improvement to Land 5000 Buildings/ Structures 6000 Utilities 7000 Equipment 8000 Demolition & Removal Indirect Costs	296,000 0 2,458,000	• • • • • • • • • • •		5,041,000	6,406,000
Construction Management Field Engr and Const Mgmt Const Mgmt Reserve	579,000 341,000		280,000 165,000	1,365,000	
Government Furnished Materia Purchased By CM Purchased By EG&G Procurement Fee	1 0 1,303,000 26,000	•••••	0 523,000 10,000	• • • • • • • • • • • • • • • • • • • •	1,862,000
Project Administration Costs Project Management Project Support	280,000 30,000	•••••	129,000 14,000	•••••	453,000
Subtotal	• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • •	· • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • •	10,417,000
				• • • • • • • • • • • • • • • • • • • •	
Escalation (included in abov	e totals)	• • • • • • • • • •	3,183,000		
Total Esti	mated Cost	••••		• • • • • • • • • • • • • • • • • • • •	14,000,000
COMMENTS: The total conting reserve and conticontingency for a	ency, which ngency, is s	includes bo	oth constructors. Thi	tion manage	ment.

TYPE OF EST. Planning

EG&G idaho, Inc.

15V Production Power

PROJECT

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TOTAL COST	OTHER COST	MAT'L T200	LABOR LABOR	LABOR	TOTAL   LAB. HRS.	UNIT LAB.	.TU .TAM T200	J'TAM TINU	b'H     E'A'	DESCRIPTION	, TOOA , OM
34	/bbc,q BA:	СРК, Ф\1		4	Ket.	H) Handbook	)			J. M. Beller	JESTER
1}H 'r 'a	Prep. By:					V) Vendor P) Pur, Ord	)			INEL	
101	:96e4				•	183 .gn3 (3				INE)	NO11/

68/60/50

Date:

#### DETAILED COST ESTIMATE (CONT.SHEET)

EG&G IDAHÓ INC. Page 2

**ISV Production Power** 

PROJECT

TYPE OF EST. Planning

Date: 05/09/89

Page: 2 of 4

	••••••										
ACCT. NO.	DESCRIPTION	E,V,   P,H	MAT'L UNIT	MAT'L UT. COST	UNIT LAB. HRS	TOTAL LAB. HRS.	LABOR RATE	LABOR COST	MAT'L COST	OTHER COST	TOTAL COST
6000	Yard Area				l	0	•	0	0		0
	Area Lighting		1 LOT	l	1	0	••••	0	0 (	6000	6,000
	Underground Duct Bank		ALLOWANCE	15000	l	0		0	0 (	20,000	20,000
	Static Wire, Poles & Hardware		8 EA	3000	16	128	27	3,456	24,000	1000	28,456
	Steel Support Structures	1 1	9 EA	15000	120	1,080	27	29,160	135,000	5000	169,160
	138 KV Power Line	1 1		<b>l</b>		0		0	0		0
	70 Ft. #1 Cedar Pole		423 EA	1000	16	6,768	27	182,736	423,000	2000	607,736
	Cross Arms, Insulators & Misc.		423 SETS	2500	24	10,152	27	274,104	1,057,500	3000	1,334,604
		1 1				0	l	0	0		0
	13.8 KV Underground Feeders	1 1	·	l		0	İ	0	0		0
ا	5 in Conduit (PVC)	1 1	2,500 LF	3	0.04	100	27	2,700	7,500		10,200
l	5 in Conduit (RGS)		1,000 LF	19	0.06	60	27	1,620	19,000		20,620
	3 in Conduit (PVC)		1,600 LF	1	0.02	32	27	864	1,600	1	2,464
	3 in Conduit (RGS)		200 LF	3	0.03	6	27	162	600		762
	500 MCM 15KV Copper Wire	1 1	8 MLF	5716	70	560	27	15,120	45,728	1	60,848
	1/0 15KV Copper Wire		1.4 MLF	1707	29	41	27	1,096	2,390	 	3,486
	Control Wiring	1 1	15 MLF	500	8	120	27	3,240	7,500		10,740
			ا	l	١	0	1	0	0		0
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			]	1		0		0	0	1	0
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ا						0		0	0	1	0
	Total, This Page					**************************************		:=======:   	**************************************	*=====================================	2,275,076

#### DETAILED COST ESTIMATE (CONT.SHEET)

EG&G IDANG INC. Page 3

PROJECT ISV Production Power | Planning | Planning | Planning | Page: 05/09/89 | PROJECT ISV Production Power | P.V. MAT'L MAT'L UT. UNIT LAB. LAB. RATE | COST | C

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183,300	Ī							1	1	Total, This Page
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٥٠٤΄Σ ,		300	3,240	1 42	osr	07	001	] V3 E	1	Electronic Relay
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000'01	00001	o	o	i	10		. <u>.</u>	1 EV		138KY 2000A Circuit Breaker, SF6
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#### DETAILED COST ESTIMATE (CONT. SHEET)

EG&G IDAHÓ INC. Page 4

ISV Production Power

**PROJECT** 

TYPE OF EST.

Planning

Date: 05/09/89

Page: 4 of 4

ACCT. DESCRIPTION LABOR LABOR MAT'L TOTAL NO. LAB. HRS. RATE COST COST COST COST IGFE EQUIPMENT 0 | 0 1 20 MVA Transformer 0 | 0 | 900,000 36,000 | 936,000 138 KV 2000A Circuit Breaker 80000 I 0 I 80,000 | 5,000 | 85,000 138KV Air Circuit Breaker 0 1 0 | 0 | 0 Manual Operated 6000 0 I 18,000 18,000 Motor Operated 6 EA 8000 0 | 48,000 48,000 | Remote Terminal Unit, MPR-3010A 14000 0 | 0 | 14,000 E 14,000 | Electronic Heter 3000 0 | 0 | 3,000 | 3,000 ! Electronic Relay 23000 0 | 69,000 | 69,000 | Electromechanical Relays 3 LOT 32500 97,500 97,500 Lightning Arresters 8 EA 4000 32,000 32,000 \* |Total, GFE 1,302,500 0 1 0 0 1 0 0 1 0 | 0 ] 0 0 1 0 | 0 | 0 0 | 0 [ 0 0 1 0 1 0 0 1 0 1 0 1 0 1 0 | 0 1 0 | 0 0 |

### ESCALATION SHEET

Project

or Description : ISV Production Power

Location : INEL

Requested By : J. M. Beller

Date : 05/09 /87 Page : 1 of 1 Prepare'd By : P. J. Hill Chk'd/appr'd By :

													CIIK U	/appr	u by :		
Fiscal Years :	FY89	1	FY90		FY91		FY92		FY93		FY94		FY95		FY96	//	====== //////
Calendar Years	CY89 JFMAMJJASOND		CY90  JFMAMJJASOND		CY91 JFMAMJJASOND		CY92 JFMAMJJASOND		CY93 JFMAMJJASOND		CY94 JFMAMJJASOND		CY95  JFMAMJJASOND		CY96		TOTAL COM-
Escalated Months & Yearly Percentage	Months	Yrs %	Months	Yrs %	Months	Yrs %	Months	Yrs %	 Months	Yrs %	  Months	Yrs %	  Months	Yrs %	Months	Yrs %	POUNDED %
Title I, II	8	3.0	12	5.3	12	5.4	12	5.8	12	6.0	3	1.5	0	0.0	0	0.0	30.13%
Title III	8	3.0	12	5.3	12	5.4	12	5.8	12	6.0	12	6.0	12	6.0	6	3.0	48.37%
Construction Period	JFMAMJJASOND JFMAH		JFMAMJ	JASOND JFMAMJJASOND		JFMAMJJASOND		JFMAMJJASOND		JFMAMJJASOND		JFMAMJJASOND		JFMAMJJASOND		 	
Labor	8	3.0	12	5.2	12	5.5	12	5.8	12	6.1	12	6.1	12	6.1	3	1.5	46.66%
Mat'l & Subcontracts	8	2.7	12	4.4	12	4.7	12	5.2	12	5.4	12	5.4	12	5.4	3	1.4	40.10%
Equipment	8	2.7	12	4.4	12	4.7	12	5.2	12	5.4	12	5.4	12	5.4	3	1.4	40.10%
Indirects	8	3.0	12	5.2	12	5.5	12	5.8	12	6.1	12	6.1	12	6.1	3	1.5	46.66%
PM	8	3.0	12	5.3	12	5.4	12	5.8	12	6.0	12	6.0	12	6.0	3	1.5	46.21%
СМ	8	3.0	12	5.3	12	5.4	12	5.8	12	6.0	12	6.0	12	6.0	6	3.0	48.37%
FE	8	3.0	12	5.3	12	5.4	12	5.8	12	6.0	12	6.0	12	6.0	6	3.0	48.37%
Equipment & Material		4.0		4.4		4.7		5.2		5.4		5.4		5.4	******	5.4	
Construction Labor		4.5		5.2		5.5		5.8		6.1		6.1		6.1		6.1	
Construction Indirects		4.5		5.2		5.5		5.8		6.1		6.1		6.1		6.1	•
Title I, II, III		4.5		5.3		5.4		5.8		6.0		6.0		6.0		6.0	
PM-CM-FE		4.5		5.3		5.4		5.8		6.0		6.0		6.0		6.0	
Composite		4.4		4.8		5.1		5.6		5.7		5.7		5.7		5.7	